Measuring regional creative capacity: A literature review for rural-specific approaches

Gulumser, A.A.; Baycan Levent, T.; Nijkamp, P.

2011

document version
Early version, also known as pre-print

Faculty of Economics and Business Administration

Measuring regional creative capacity: A literature review for rural-specific approaches

Research Memorandum 2011-15

Aliye Ahu Gülümser
Tüzin Baycan-Levent
Peter Nijkamp

vrije Universiteit *amsterdam*

Measuring Regional Creative Capacity: A Literature Review for Rural-Specific Approaches

Aliye Ahu GÜLÜMSER[1,2]
corresponding author
gulumser@itu.edu.tr
agulumser@feweb.vu.nl

Tüzin BAYCAN-LEVENT[1]
tuzin.baycanlevent@itu.edu.tr

Peter NIJKAMP[2]
p.nijkamp@vu.nl

[1]*Department of Urban and Regional Planning, Istanbul Technical University, Taskisla, 34437, Taksim, Istanbul, TURKEY*
[2] *Department of Spatial Economics, VU University Amsterdam, De Boelelaan 1105 1081 HV Amsterdam, The NETHERLANDS*

Abstract
Recent theories on regional creative capacity often focus on urban regions without taking into account rural regions. In addition, the application of such analyses to rural regions may lead to misrepresentation or misunderstanding of rural creative capacity. Against this background, the aim of the present study is to integrate the existing literature on different components of creative capacity, viz., knowledge, innovation, entrepreneurship and networks, in order to build a more comprehensive framework for rural creative capacity and its evaluation. In the light of the perspective from the empirical literature review on the evaluation of creative capacity in rural regions, various empirical measurements seem to misrepresent or underestimate the creative capacity of rural regions. Therefore, there is a clear need to use the locality in relation to its dynamics, i.e. tacit knowledge, cultural heritage and social and physical environment, as the main and basic measurement unit for creative capacity analysis.

Keywords: Creative capacity, rural regions, innovation, sustainable competitive advantage

1. Creative Capacity Studies

Creative capacity studies have a long and outstanding history in the field of psychology focusing on the capacity of individuals, groups and organizations – particularly firms. But, regional creative capacity is the subject of recent studies which focus particularly on especially urban and developed regions. 'Creative capacity' means the capability of any region to generate knowledge, and thus to achieve innovation and the diffusion of innovation activity, while ensuring the viability and sustainability of this process.

There are several reasons why such studies focus mainly on urban regions. One is that the effectiveness of creative capacity can be measured over a long-term period. It is much easier to generate theories and to develop the concept for urban regions which have already benefitted from their creative capacity for a longer time than rural regions have done. Also, the regional creativity concept was first introduced in cities and urban areas by Florida in 2002. Another reason is the limitations of data on rural regions, i.e. the lack of such data; the difficulty to obtain and collect accurate data; the lack of comparable data.

Rural regions are by far different from urban regions in terms of their socio-economic structures. They are usually evaluated as less developed than urban regions. Therefore rural regions have poor living conditions. As Sen stated in his work, according to the Aristotelian perspective, the richness of human life was explicitly linked to the necessity to "first ascertain the function of man," followed by exploring "life in the sense of activity" (Sen, 2000). This statement actually emphasizes that in regions where the poverty is obvious the opportunities rely on the activity thus, on distinct capabilities and functionings (Sen, 2000).

However creativity theories focus on urban regions and usually misrepresent/underestimate creativity in rural regions, rural regions show an increasing trend in order to attract creative class. Creative class attracted by rural regions can be different than the creative class of Florida but they are people in action that realize economic opportunities and create their own innovative activities. This attraction is not obtained by technology, availability of infrastructures or job opportunities but rather by the quality of life and locality characteristics of rural regions (Gülümser et al., 2009). Therefore, rural regions have no longer the deprivation of their capabilities that the poverty is seen as but rather regions of opportunities. Due to the demographic changes in rural areas, socio-economic transformations can be sometimes problematic sometimes successful. But for sure, they have become more dynamic by having various intervening opportunities. Therefore, these transformations change also the position of rural areas in the global market and competitive arena. In other words, the heartland-hinterland paradigm is lost in our knowledge-based era as rural regions also enjoy the benefits from its localities (Brown and Grillard, 2006). From this point of view, it is possible to define rural areas as settlements characterised by a unique cultural, economic and social fabric, an extraordinary patchwork of activities, and a great variety of landscapes (Cork Declaration, 1996).

Rural regions entered in the global competition arena by the sustainable development and endogenous development efforts. Both development attempts aim to promote locality features in the global arena mainly by the ignition of entrepreneurship and research and development (R&D). Knowledge, innovation, creativity, entrepreneurship and networks are seen as the real engine of economic and sustainable growth particularly over long term period (Florida, 2002; 2005; Forte et al., 2005), however they had a negative destructive effect especially on social environment. Although the contribution of creative capacity is very much

discussed in the literature, the negative impact on social environment especially in rural regions which are closed social communities is discussed in a very literature, e.g. Dargan and Schuksmith, 2008. Therefore, in the literature, the effect of creative capacity offers a dual approach.

The well-managed development of these five concepts and their cyclic interrelations can lead to sustainable competitive advantage for a region by exploitation of its uniqueness. The uniqueness of a region can be seen as creativity (Bowen et al., 2006) which is the necessary starting point of innovation in order to exploit new ideas, creating or transforming a form of knowledge (Fritsch, 2007). In addition, creativity is at the heart of the quest for a sustainable competitive advantage (Santanen et al., 2000). Therefore, innovation is the process of the application of output of creativity act by using effective techniques associated with technology and R&D systems and also shaped by the demand in the market (Kirchhoff, 1994; Busenitz et al., 2000). Thus, the innovative output which is a type of knowledge (see for further information 'Knowledge Production Function' in Grilliches, 1990; Audretsch, 2003) is ready to be promoted in the market or to create a new niche market for it in order to compete. The achievement of the complex route of sustainable competitive advantage to success of a region however seems to depend mainly on the creation of an innovative and entrepreneurial milieu, the creative capacity of a region is the basic identifier to reach success in sustainable development. Capacity of region means what exist and what can exist or be absorbed by a region. But regional creative capacity and its dimensions are mainly measured by returns and output of the processes of which effectiveness and efficiencies depend on creative capacity. In other words, creative capacity of a region is usually measured by already existing strengths of regions rather than their intervening opportunities. Therefore, creative capacity of a region can be sometimes under estimated or represented.

The literature on some components of creative capacity is very well developed while the rest is not yet studied enough in order to overcome with general arguments on rural creative capacity. Thus, there is a need to combine the current knowledge on innovation and rural regions in order to conduct more effective researches and policies for the best of sustainable rural development. In addition, the theoretical evaluation of creative capacity do not match with some of the empirical evidences in rural studies literature, e.g. Keeble et al., 1992; North and Smallbone, 2000. On this basis, the aim of this paper is to reflect the existing literature on different components of creative capacity, viz. knowledge, innovation, creativity, entrepreneurship and networks from a rural specific perspective while generating overall arguments about rural creative capacity. In order to achieve our aim, due to the lack of rural creative capacity instead of focusing immediately on the concept on the success route of a region in terms of achieving sustainable competitive advantage.

Section 2 describes the concepts and the stages of the success route of a region while Section 3 offers how the creative capacity is measured in the literature. Section 4 investigates the rural creative capacity compared with the urban creative capacity. Section 5 generates arguments on the important highlights about how to evaluate rural creative capacity. The study concludes with some propositions to evaluate rural creative capacity.

2. The Success Route of A Region: Concepts and Stages

The basic success route of a region depends on the innovation process of which the output is promoted in the competitive arena (Figure 1). However it seems simple, both the achievement of innovation process and promotion process do not automatically bring success

to a region (Florida, 2002; 2005; Forte et al., 2005; Napier and Nilsson, 2006), thus region which terminated/passed these stages can always fail (Figure 1). Each process itself has its complexity and sub-stages which need special treatment and careful management. In this section, we focus on two stages; innovation and promotion stages on the basis of five components of creative capacity, viz. knowledge; innovation, creativity, entrepreneurship and networks.

Figure 1. Basic success route of a region

However innovation is usually connected to high-tech or technological novelty/progress, it is actually the process of generating and applying creativity by the promotion of an existing product which ends up with and output of new product (Figure 2). Here when we talk about a product we simply mean 'knowledge'.

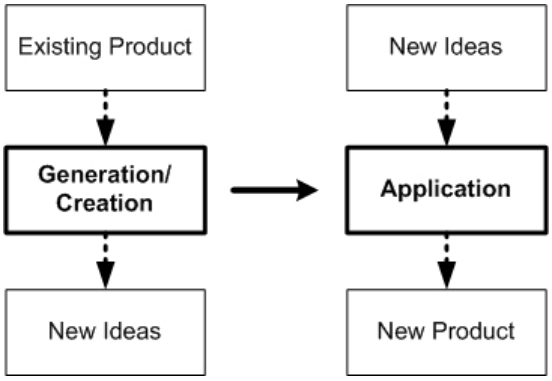

Figure 2. Stages of innovation process

The complexity starts at this stage/ in our dynamic world an existing product or simply the input of the first stage of the innovation is a form of knowledge. In a region, there exist different forms of knowledge (Tovey, 2008). Knowledge which is actually a process itself can be evaluated mainly in two types first tacit knowledge which carried by the mind of an individual therefore, the access is not easy while the second type is the explicit knowledge which is the codification of tacit knowledge and easy to communicate with (Polanyi, 1997). In the knowledge-based economy, discussed knowledge is basically forms of explicit knowledge. The forms of such knowledge in a region are:

(1) *Tacit/Traditional knowledge:* is also called indigenous knowledge and local knowledge which refers usually the traditions and practices transferred for generations and is the economic resource of neo-endogenous development (Ray, 1998). However local knowledge is usually mixed with the knowledge in the locality which can be in another form of knowledge i.e., transferred or expert knowledge or brought knowledge by migrants or newcomers depending on the diversity of the region and the intensity of external ties (Siebert et al., 2008).

(2) *Transferred/Brought knowledge:* is basically the knowledge beyond the region which is brought or transferred through networks and became knowledge of the population.

It can be scientific knowledge, expert knowledge or also learnt knowledge through education.

(3) *Created knowledge:* is the knowledge which is new for and generated in the region.

Knowledge is a complexity of perception, learning, communication, association and reasoning. In a knowledge-based economy, overtime, all forms of knowledge will become the knowledge in the region or local knowledge thus, the distinction of different forms of knowledge depend on profiles of actors, i.e. experience; education; skills; age; origin; expertise; and their background. For instance, an elderly local inhabitant can use traditional knowledge while scientist can use created knowledge as the input of innovation process. On the other hand, knowledge as the output of the innovation process is somehow a processed knowledge and a new product.

Having the input, the first stage of innovation process is the 'creation/generation' stage referred in the literature as knowledge creation (Nonaka, 1994). At this stage, by using an existing product, new ideas, concepts, and associations are generated. This act is called 'creativity' which is regarded as one of the most important elements of human capital in keeping and long term viability (Wiig, 1997). The second stage of innovation is the 'application' of new ideas using the output of previous stage. New ideas are generated in order to obtain efficiency and productivity thus application process needs a well-developed research and development system in itself. R&D is a systematic tool to ensure the success of the result of the innovative process. R&D is very much related to innovation thus is undertaken in association with technology or technological development, but it is much more related to social and natural sciences development and sometimes does not dominantly use technology. R&D will also generate insights for the achievement of success route for the stage of promotion by investigating the availability of the product in the market and/or the availability of a market or demand for the new product. In other words, R&D will also specify insights for the strategies of promotion process.

Besides R&D, the application process needs also an adoption/adaptation/absorption process through which the performer of the application of new ideas will assimilate and learn application techniques. The adoption process is not only valid for the innovator/ the entrepreneur but also for the scientist who learn from the local inhabitants. The last process in the route of success is the promotion stage. This process may be not the fundamental but it is the indispensable one in the success route. Without this stage, the innovation process can be worthless. However we do not focus in the marketing of the product in order to be able to understand the fundamental role of creative capacity and the importance of specific actors, i.e. entrepreneurs, and specific concepts, i.e. networks and ties, we can discuss in a broader sense this stage as well.

Promotion stage is much related to the actor and their networks. At this stage, besides the infrastructure and market situation, the personality of the actor plays a crucial role. Actor – more specifically innovator – in order to reach his/her aim needs to be a risk taker, fearless and trusted. An innovator is already a risk taker concretizing new ideas but need to be more courageous to expose its product into the market. On this basis, innovation is always seen linked to entrepreneurship. Entrepreneurship is the willingness and ability to convert new idea into a successful innovation, thus into the competitive market. However there is no common definition of entrepreneurship (Wenneker and Thurik, 1999; Nijkamp, 2003; Naudé, 2007). Entrepreneurship is definitely related to innovation (Schumpeter, 1934; 1950) and risk taking (Knight, 1967; Drucker, 1970) and its contribution to both local and the national

economy is accepted by various researchers from different fields, thus is regarded as the main tool of sustainable development.

The last concept of the success road in a knowledge based economy is the 'network'. The term network is used by many disciplines (Camagni and Salone, 1993; Ward and Williams, 1997; Sassen, 2001; Trullén and Boix, 2003; Taylor, 2004). But it means basically the interconnectivity. There are various types of networks of individuals, i.e. social; knowledge, economic. Thus here, what is meant by network is the all interrelations of actors in the region which contribute to different stages of the success process especially to the promotion and transfer of the innovative output. In knowledge-based economy a network is not limited to face-to-face relations but includes relations obtained by any communication facilities in which the knowledge of transfer can be realized. Therefore, in the ICT era, one of the main tools to widen or create a network is the use of diverse telecommunication systems.

Having the sustainable competitive advantage in knowledge-based economy, the success road seems to be a cyclical process rather than a linear process. The endogenous dynamism, growth and the active mechanisms of change which are very much concentrated on the phenomena of entrepreneurship and innovation can secure regional competitive advantage (Scott, 2006). But the dynamic form and individualistic structure of knowledge and also creativity led each success road of and inside the regions. In this section, we summarized the literature on the success route of a region. Although most of the literature is on urban regions, in order to investigate the rural regional creative capacity, it is important to understand how the creative capacity and its components are related to the regional scale.

3. Measuring Creative Capacity

The concept has five components, viz. knowledge; innovation; entrepreneurship; creativity; and networks (Table 1). To use these components and their indicators to measure regional creative capacity has both advantages and disadvantages. The first component 'knowledge' as an input in the success route towards obtaining sustained competitive advantage in the knowledge-based economy is usually measured by the values, culture and traditions in the region. It is the most difficult component to measure as it depends on the codification of individuals found out during research or in documentations. It is very important to measure such component in order to reflect locality features and codify hidden/unknown knowledge to be ready for transfer. Knowledge existing in the region is one of the keys to the success of that region (Maskell et al., 1998). It gives insights about the reasons, motivations and capabilities of individuals, communities, organizations which will facilitate the implementations of success route. The difficulty of accessing and the possibility of misinterpreting of the knowledge when retrieving it from local practices, observations and documentation, and also the individualistic and cognitive structure of knowledge can be seen as the disadvantages or the failure of this component (Neelamegehan and Chester, 2006). In other words, knowledge which is the basic component must be carefully investigated.

The second component is 'innovation'. Innovation being the most discussed process is very well-documented in the literature, but still maintains its paradoxical structure. Innovation or its output as knowledge is measured by research and development (R&D) structures of both private and public initiatives – particularly universities: its rate of return, expenditures and employment; patents; technological parameters; productivity; diversity of industries; characteristics of region with a special focus on specific sectors known as innovative sectors (Grilliches, 1990; Rogers, 1998; Audretsch, 2003). The measurement of

innovation is very important as it is related to productivity, efficiency, growth and it is one of the key contributors to the elimination of regional disparities while reflecting contemporary face of a region. Therefore, measurement of innovation have numerous advantages among which its capability to facilitate and orient future policies, investment decisions of both public and private stakeholders; and its ability to ease the interpretation of growth and needs of a region to obtain sustained competitive advantaged can be mentioned.

The third component is 'entrepreneurship' which was ignored in the early economic theories, but recently became one of the key elements of competitiveness and development. Due to diverse definition of entrepreneurship, its measurement has various parameters depending on the scale and focus of the research. But quality and quantity of social and human capital, characteristics and background of entrepreneurs and characteristics of businesses are the main parameters for the measurement of entrepreneurship. Basically, entrepreneurship refers only to the entrepreneur not only as an individual but also as a change agent in an environment, and is very much related to the notions of social capital and networks (Noteboom, 1999; Cooke, 2002; Elfring and Hulsink, 2003; Westlund and Bolton, 2003). Due to the importance of the notion in boosting the socio-economic development and its power in changing socio-economic environments, the measurement provides an understanding of actions, trends, motivations and relations in the region. Moreover, the diversity face of the notion itself can cause disadvantages of the measurement. The measurement of the entrepreneurship is weak in terms of its dependency on the individual dependency of the researcher and research questions. Entrepreneurship measurement is again important for policy and strategy development.

Table 1. Measurement of creative capacity

Component	Advantages	Disadvantages
Knowledge as an input values culture traditions	reflect locality creates transfer of knowledge	can be misrepresented difficult to access individualistic – personal cognitive
Innovation/Knowledge as an output R&D patents diversity of industries technology productivity characteristics of the region	ease policy implementations and investment decisions easy to interpret growth and competitiveness capacity environment is included	ignores traditional knowledge, give too much importance to scientific knowledge and biased towards technology and misinterpreted/ questionable, regional characteristics are missing especially natural and man-made environment and capital.
Entrepreneurship characteristics of entrepreneurs characteristics of business human capital social capital sectors social structure of the region	ease the interpretations of policy and actions in regions	depends on researcher's interpretation
Creativity creativity indexes creative class demographics creative industries	explains the residual missing part of the growth	open to discussion / questionable, newly developed and one-sided and biased interpretation of less developed or innovative regions
Network market relations market conditions use of ICT efficiency	solve the complexity of running operations	difficult to understand and sometimes misrepresented in terms of social relations and informal relations

The main component of creative capacity is no doubt 'creativity'. This notion, having more than 60 definitions elucidated with respect to the arts, has a long history especially in the field of psychology (Sternberg, 1998). In contrast, creativity in regions or cities – a recently developed form of creativity – was first introduced by Florida (2002). However, being so recently popularized, there are not many contributions to the measurement of creativity, and Florida's own measurement has been criticized. The notion in regional sciences fostered and became a relevant way of explaining the residual of early functions by giving much importance on knowledge and thus measurement is basically related to workers

having a knowledge-based job. Regional creativity is measured by different indexes, i.e. the bohemian index; the gay index; the diversity index with a special focus on a group of people called the 'creative class', who work in the 'creative industries'. Factors that attract the creative class are not just the job opportunity but the cultural supply; tolerance; openness to new ideas, new people and new lifestyles; and also the stimulus or inspiration of new experience. Because of the recent development of the notion of creativity, it remains obscure and open to discussion, and therefore there have been many criticisms on the scientific and empirical side of the study (i.e. Glaeser, 2005; Qian and Roger, 2008), or it has been recommended that the field must be revisited (Scott, 2006; Peck, 2007). Thus, it is accepted in the academic arena that the field of creativity is empirically and statistically biased and misinterpreted including the paradoxical sometimes insufficient side of the measurement. However, it is also evident that creativity can provide a boom in the economy and increases the competitive advantage of a region (Scott, 2006).

The last and the most important component of regional creative capacity is 'network'. Network, which realizes the transfer of product – particularly knowledge, became the key parameter of obtaining success in the knowledge-based economy. A network consists of individual actors, which are called nodes and the relationships between them that are called ties. In the literature, there are at least 14 types of networks, e.g. policy networks, collaborative networks and action networks (Agranoff, 2006). Through network(s), innovation can create a sustained competitive advantage and thus a region can be visible. The parameters of networks are also diverse but basically focuses on characteristics, depth and nature of relations and tools of communications i.e., ICT and their efficient use in both market and socio-economic region. Measuring networks provide insights about the complex systems in a region but can misrepresent as it usually neglects or has difficulties to measure informal networks.

The measurement of regional creative capacity is not yet clearly identified however it has basic assumptions in terms of capacity of cities and urban regions, however these assumptions may differentiate in rural regions. This calls for a specific focus for rural regions. Therefore in the next section, we will compare urban and rural regions on the basis of their creative capacity components.

4. Regional Creative Capacity: Urban Regions vs. Rural Regions

Rural areas used to be isolated, traditional and less-developed regions in a country, and were usually seen as the opposite of, and dependent on, urban areas (Jacobs, 1969). But, in our modern age, they have enjoyed the benefits of the ICT era and can be distinguished less than in the past from urban areas and cities, with the exception of their demographic and natural characteristics (Gülümser et al., 2008b). In urban regions, the structure of life is usually based on the pursuit of jobs and opportunities but in rural regions job follows the pursuit of quality of life and lifestyles, desire of people (Vias, 1999; Malecki, 2003; Labrianidis and Kalogeresis, 2006).

In the field of regional sciences, there is a very limited number of studies which investigates the creativity and creative capacity of rural regions. On the other hand, urban regions and cities are the main interest of creativity studies. Limited available data on rural regions, diversity of economic activities in today's rural regions and their dynamism increased and intensified the complexity of rural regions. Therefore, rural regions are not anymore the homeland of agriculture but regions of diverse intervening opportunities. The

latest discussions on the distinction of urban and rural regions stress more on the convergences of these different types of regions. The urban-rural dichotomy is the oldest and endless discussion on everyday life, policy circles and academic arenas of diverse disciplines. However urban and rural regions are not seen as dichotomous as rural regions can also benefit from what ICT era and knowledge-based economy offer. However they are physically different but functionally interrelated and close to each other in terms of the diversity and the increase of flows and different accumulation. Their differences in terms of socio-economic structures and regional characteristics by their visibility and capabilities in the global arena remain the same.

Ideal incubator area offering many different positive externalities (Struyk and James, 1975) is claimed to occur most often in the core areas of large urban regions with their dense infrastructures, their abundant supplies of rental premises for commercial use, and their diverse services (Scott, 2006). Hence new entrepreneurial ventures will be most likely to flourish. But they are not sufficient to explain the whole because of their evacuation of social context, misleading biological metaphor stands in the way of a more resolute grasp of the social and spatial forces at work (Scott, 2006).

The results of empirical studies show that urban areas compared with rural areas have much more creative capacity and are able to transform this into strengths and opportunities (Table 2). In addition, the strengths of urban areas are seen as weaknesses of rural areas. However, these weaknesses are basically opportunities that can be transformed into strengths in the future with right and clever policies. Nevertheless, sometimes these opportunities are also seen as threats for rural areas. For example, the increasing trend of counterurbanization which brings diversity to the knowledge base in rural localities, can destroy the tacit knowledge which has already been transformed over the generations. In addition, with counterurbanization and the changing quality of life, rural areas are becoming the place of experiencing the desired lifestyle for urban inhabitants thus contributing to the displacement of the indigenous inhabitants. This does not ease but, on the contrary, strengthens the rural-urban migration.

Table 2. Summary of urban and rural regional creative capacity studies

Urban Creative Capacity Studies	
Strength	**Weakness**
Transferred/brought knowledge: diversified - easy to access *Created knowledge:* technology based – diversified – high registered (high patent) *Innovation:* high – easy to achieve – high R&D – high level of productivity in all sectors *Entrepreneurship:* small, medium or large size of business – high growth *Creativity:* high economic success *Promotion:* easy access to ICT – efficient use of ICT – diverse and extensive market *Human Capital:* highly skilled/educated *Actors:* courageous *Support:* diverse	*Traditional Knowledge:* transformed *Social Ties:* mixed ties
Opportunity	**Threat**
Traditional Knowledge: diversity of culture *Innovation:* low risk – based on technology – easy to adopt –fast take-ups – high technology *Entrepreneurship:* mixed business formation – stable business formation *Creativity:* high technology use – diversified among sectors – fine arts – openness – tolerance – high technological – high artistic/cultural *Networks:* high density – informal/formal networking *Human Capital:* any labour *Man-made Capital:* high infrastructure – diversified *Sector:* diverse *Actors:* mobile	*Entrepreneurship:* shorter establishment *Networks:* depends on individual ties *Human Capital:* excess *Natural Capital:* destroyed *Actors:* mobile
Rural Creative Capacity Studies	
Strength	**Weakness**
Traditional knowledge: relatively protected *Entrepreneurship:* longer establishment *Network:* low formal network – high informal networking	*Created knowledge:* exists through needs of inhabitants – limited – usually remains as unknown (low patenting) *Innovation:* low rather continuity of existing – high risk – difficult to achieve – low technology – R&D exists only if government invests in it and universities exist in the immediate environment *Entrepreneurship:* small growth – less mixed business formation – unstable business formation

Social Capital: strong internal ties *Natural Capital:* well-protected *Actors:* stable	*Creativity:* very low high tech – focused on agriculture and manufacturing as the tech-user sectors – open depending on the localism – low level of tolerance – no or few technological *Promotion:* difficult to access *Network:* limited density – depends on the defensive localism – low formal network, high informal networking *Human capital:* shortage – family labour *Man-made capital:* single *Sector:* mainly based on agriculture and manufacturing *Actors:* Stable – fear *Support:* Limited
Opportunities	**Threats**
Traditional knowledge: Single culture *Transferred/brought knowledge:* exist side-by-side in the region *Innovation:* high level of productivity in agriculture and manufacturing *Entrepreneurship:* small size of business *Creativity:* inspiration for art – economic – artistic/cultural *Natural Capital:* well-protected *Man-made capital:* one form	*Transferred/brought knowledge:* difficult to access *Innovation:* lack of technology – difficult to adopt – slow take-ups *Promotion :* limited use of ICT – limited market *Human capital :* low skilled / less educated *Man-made capital:* shortage of infrastructure

Empirical studies suggest that tacit knowledge can be the best input for R&D activities, and scientific knowledge needs to respect and try to understand instead of ignoring it, and to assimilate such knowledge (Fonte, 2008). Thus, R&D activities based on technology first in agriculture later in manufacturing however increased the productivity and rates of returns in both economic and social environment, their side effects are seen. Therefore, today, scientists try to generate organic farming culture in rural regions which is the combination of tacit knowledge and R&D but not the technological side. Again another thing related to technology is the lack of infrastructure in rural regions. Although rural regions are eager to benefit from ICT, and rural inhabitants participate in ICT training and extension more than might be expected, the efficient use of ICT has not yet been achieved in rural regions, as rural inhabitants do not have enough technical infrastructure to practice their skills and learnt knowledge.

Not only in technology but also in entrepreneurship it might be expected that there will be less growth, and less innovative activities in rural areas. However, some empirical evidence shows that actually rural regions are more innovative and entrepreneurial than their urban counterparts (Keeble et al., 1992; North and Smallbone, 2000). These results are due to the research focus and rural specific treatments, so that the generalization of regional creative capacity for both urban and rural regions can misrepresent the intervening opportunities of rural regions and related policies, thus, putting their cultural heritage in danger. In other words, in terms of abilities and capabilities urban and rural regions are quite different. This

means comparing 'apples' and 'pears' with same parameters can cause problems. On this basis, the next section offers an argumentative approach of creative capacity for rural regions.

5. Creative Capacity of Rural Regions: An Argumentative Approach

On the basis of above-mentioned reasons and on the basis of recent empirical evidence on regional creative capacity, evaluating rural regions using the same approaches and measurement techniques applied to urban regions seems to fail (McGranahan and Wojan, 2007). These applications have usually resulted in indications of shortages and defficiencies in rural regions, i.e. infrastructure, human capital or technology, while stressing the weaknesses of rural regions. Therefore, rural regions are usually seen as places which have less creative capacity. On the contrary, rural-specific studies have proved the high level of creative capacity in rural regions. The reason is that usually rural-specific studies use a positive approach to evaluate rural regions.

Because of these diverse and contradictory results and the limited number of empirical studies focusing on rural regional creative capacity, an overall argument about rural creative capacity has not yet been provided in the literature. This calls for a systematic review of the literature of the components of creative capacity. Thus, this paper offers an argumentative approach both in the sense of representing the complexity of each dimension of creative capacity of a region and the capacity itself on the basis of the combination of empirical studies.

Therefore, on the basis of a review of empirical studies and the literature review, we have generated three arguments viz., (1) rural creative capacity needs a more rural-specific approach; (2) rural creative capacity depends on locality features; and (3) rural creative capacity needs more suitable data than registered data. In the following, we will discuss these arguments by the findings of early applied studies.

1st Argument: 'Rural creative capacity needs a more rural-specific approach.'

This argument is also the basis of the other two arguments on rural creative capacity. Creative capacity which was popularized by Florida (2002) is measured as a fast rate of employment growth not only for urban areas but also for rural regions. McGranahan and Wojan (2007) applied both Florida's urban-specific approach (Florida, 2002) and their own rural-specific approach to measure rural creative capacity. Thus, they proved that an urban-specific approach underestimates rural creative capacity. The reasons for this underestimation are that rurality measures, i.e. natural amenities, rural lifestyles and quality of life, are lacking and urban-specific parameters, i.e. low crime rates, low taxes, high-tech technologies are not suitable as measures for rural regions. Thus, when evaluating and investigating rural creative capacity, it is important to keep in mind rural characteristics, rural features and circumstances.

2nd Argument: 'Rural creative capacity depends on locality features.'

McGranahan and Wojan (2007) have already shown that rural creative capacity depends on locality features which are the vehicles of competitiveness in rural regions (Gülümser et al., 2009). However locality parameters can be multiplied, here we focus on four main features, viz. (i)traditional/local knowledge; (ii)technology; (iii)human capital; and (iv)distance.

Traditional/Local Knowledge: The existing literature on the new paradigm of rural development has already taken into consideration local knowledge as the development resource (Ray, 1998; Ploeg et al., 2000; Marsden, 2003; Ploeg and Renting, 2004; Tovey, 2008). The value of tacit knowledge and the necessity to protect it are mentioned by various

international groups viz., The United Nations Conference on Trade and Development (UNCTAD), the World Intellectual Property Organization (WIPO) and the World Trade Organization (WTO) (Fonte, 2008). Usually knowledge with science and technological expertise gives little recognition to the role of tacit knowledge in its generation and use (Koutsouris, 2008) and causes the destruction and loss of local knowledge. But in the national development process, local values, and world views and understanding of marginalized communities all need to be recognized, respected, honoured, and adhered to by the consultants and advisors who may be educated, technologically-advanced urban people (Neegelhamen and Chester, 2006). In fact, certain types of technological innovation can revalue rural knowledge especially with respect to the nutritional and medicinal uses of plants and animals (Fonte, 2008). Tacit knowledge will then be reborn and will be a mixture of scientific and local knowledge which will increase the productivity, shorten the adoption and innovation process in rural regions. The use of tacit knowledge will ease the adaptation and participation in rural areas. Hence, the awareness will increase, and tolerance/openness will be obtained. Thus, rural regions will attract the creative class and increase their creative capacity.

Technology: The use of technology may affect tacit knowledge or traditional knowledge negatively. If this is the case, in rural regions, one might then question the continual production of new technologies which opens up new possibilities for material and natural resource exploitation while ushering in new labour processes, increasing productivity and creating new products and new markets (Tovey, 2008). Innovation plays an essential role for rural economic development (Barkley et al., 2006). But a scientific-based technical process can often be something alien to rural practices and institutions (Dargan and Schuksmith, 2008). Therefore, adopting scientific knowledge by embedding, and interacting with, local conditions is an important opportunity for rural creative capacity by easing the adaptation and increasing the participation and the enthusiasm of rural inhabitants to be a part of it.

Human capital: The explanation for high innovativeness in rural SMEs is the importance of quality of life and residential attractiveness considerations for professionally qualified workers, entrepreneurs and high-tech firm founders, as well as greater availability of space and room for expansion of innovative and growing businesses (Keeble, 1993). In other words, it is not the economic challenges and opportunities in rural regions which attract the creative class, but rather quality-of-life issues (Jones et al., 2003). In an innovation cycle from adoption to effective use, from effective use to competitive advantage, a higher level of education is required in order to translate the awareness of what is on offer into practice, but it is not enough (Cornford et al., 1996). Human capital related to education and employment skills in rural regions is not registered or confirmed as the experts or the highly-educated people. The expertise of rural people depends on their local practices and experience which make them better experts than scientific or educated ones. Thus, respect for the knowledge and experiences of local people, by consolidating it with education, extension or training programmes, will create the human capital in rural regions. But, neglecting the knowledge of rural populations and trying to impose an alien type of knowledge on them will usually not attract local people to be the source of human capital. Whether they are educated or not, the rural local population can be seen as the human capital in terms of their various backgrounds.

Distance: in order to clarify this feature, we evaluate it in terms of three types of 'physical distance', which refers to the distance of rural regions to the nearest urban centres and the innovation clusters and their geographical accessibility; 'economic distance', which means

the place of rural regions and their products in the global markets; and 'social distance', which concerns the networks and relations of rural people through which they become capable of transferring knowledge and accepting the novelty.

- *Physical distance:* The distance of rural regions as peripheral and lagging regions and its effect on the returns of R&D – in a broader sense on innovation and technology – is discussed widely in the literature. Different views, i.e. the Schumpeterian view, and the neoclassical view have led to a conflict of perspectives (see Rodriguez-Pose, 2001). For instance, neoclassical theories supported investing in R&D especially in peripheral and lagging rural regions which can create economic convergence, while the Schumpeterian view – and also the von Thünen Model and core-periphery theories – highlighted the complexity of the connection of R&D and growth with a link to the spillover effects from one region to the neighbouring regions. This conflict has led public investors to doubt whether it is wise to invest in R&D in rural areas, but there is still the need to increase their creative capacity and to improve the competitiveness of economic actors (Rodriguez-Pose, 2001). Alston et al. (2000) supported the importance of R&D investments and their increasing rate of return in rural regions, stressing the paradoxical side of these effects. Rural areas are dynamic by being involved in different networks and offering a diffusion of knowledge, i.e. relocalization of food, culture, etc. but being more innovative depends on location (Lundvall, 1992; Cooke et al., 1994). The employment growth in rural regions is positively associated with innovative activity in nearby metropolitan areas only if the metropolitan area is a highly active centre of innovation and entrepreneurship (Barkley et al., 2006). In contrast, recent studies have shown that the increase of the creative class does not depend on the physical distance or R&D, but depends on the attractiveness capacity of rural regions and the motivation of entrepreneurs. Thus, there is no single sign of the association between physical distance and rural creative capacity, but the association between local characteristics/features and rural creative capacity is always positive.
- *Economic Distance:* The economic distance of rural regions is closely related to the ability both to use and to adapt communication technologies to entrepreneurship in order to succeed in the knowledge-based economy (Keeble, 1993; North and Smallbone, 2000; Malecki, 2003; Cannarella and Piccioni, 2005). However, the adaptation of rural firms and entrepreneurs to the new ICT tools is not easy to achieve. Although they learn how to use these tools, they are not able to use them in their business due to the poor provision of communication infrastructure in rural regions (Grimes, 2000). In other words, rural regions are not yet efficient beneficiaries of the ICT era, and therefore they are still using the old generation of ICT, i.e. computers, but are not that involved with the new generation technologies and e-commerce now widespread in the world. This situation creates an unfair competitive arena in the global market for the rural economy. Rural and small-town SMEs development is closely related to the growth in the wide economy of new specialized niche markets, in which small firms can supply efficiently, even though it is not more efficiently than large firms (Keeble, 1993). Thus, when evaluating rural creative capacity, measuring investments in technology – ICT – and the capabilities to adapt the ICT will offer a better estimation of rural regional creative capacity.

- *Social Distance:* This third type of distance is a measure of the closeness between players in a strategic interaction, and has recently been acknowledged to have a profound influence on individual decisions (see Akerlof, 1997). There is evidence that social distance matters more than physical distance and even more than economic distance, in terms of cooperating and transferring knowledge while creating knowledge externalities (Autant-Bernard et al., 2007). Reducing social distance is also fundamental for diminishing economic distance. Rural regions possess a very defensive localism in terms of accepting 'the new' (Winter, 2003). Therefore, in rural regions, the willingness to accept newcomers as well as new economic activities that can create and increase opportunities, in terms of increasing human capital, innovation, adaptation and economic diversity, is one of the most important determinants of rural creative capacity together with the continuity of the existing economic activities. Thus, instead of measuring the extension and density of social networks, it is better to measure the openness and tolerance of the rural inhabitants. In other words, the intensity of social networks and the embeddedness of newcomers will provide more accurate findings on rural creative capacity.

3rd Argument: Rural creative capacity needs more suitable data than registered data.

Rural firms in innovative sectors are underrepresented because of the use of patent data in many research studies (North and Smallbone, 2000). On this basis, measuring only technology-based sectors or using patent data can misrepresent the creative capacity of rural regions. Therefore, instead of measuring rural creative capacity on the basis of bureaucratic and scientific-based businesses or registered data, it is more useful to measure the potential of business start-ups which can meet the challenges of local communities and that of the businesses which use locality features – particularly local knowledge and local culture – whether combined with technology or not. In other words, rural creative capacity studies should keep in mind that those rural creative sectors which respond to the demands of post-modern societies while maintaining the continuity of rural characteristics are the innovative sectors in rural regions.

To measure rural creative capacity by the capability and capacity of rural regions, including the participation and enthusiasm of rural inhabitants, rather than with registered data, i.e. patents, the education level of the inhabitants and the accessibility and closeness to urban regions of rural regions, will be more accurate to estimate the real rural capacity. The creative capacity of rural regions is different compared with that of urban regions, and the application of urban-specific approaches misrepresents the actual capacity of rural regions.

6. Retrospect and Prospect

Creativity is a newly introduced concept based on cities and urbanized regions and much related to capability to attract 'creative class'. In addition, creative capacity concept is a new concept for rural discussions. This capability is also called in the literature as creative capacity of a region. Regional creative capacity is the starting point of a region's sustained competitive advantage and its success route therefore, explain economic growth and development. It is explained by five concepts, viz. (i) creativity; (ii) innovation; (iii) knowledge; (iv) entrepreneurship; and (v) networks. Among these concepts especially innovation which is explained by technology, high-tech firms and R&D involvement and networks referring to market externalities and access to the global market differ in measurement when rural regional creativity is the focus of the research. But however rural

regions cannot benefit widely from what on offer in our ICT era, these regions became attractor of some specific creative industries and creative class. This increasing attractiveness attracts much attention from researchers from different fields and different research focus but there is no consensus about how to measure and evaluate rural creative capacity. Also, theories based on urban regions do not match with the case in rural regions.

On this purpose in this study we aimed to investigate rural creative capacity with an analytic-synthetic approach in order to highlight distinctions of urban and rural creative capacity and the basic arguments of rural creative capacity studies. Therefore, we generated three arguments viz., *(1) Rural Creative Capacity needs a more specific rurality approach; (2) Rural Creative Capacity depends on locality features; and (3) Rural Creative Capacity needs more suitable data than registered data.* The first argument which can be also the basis of other arguments and selection of the parameters is to keep in mind rurality of the regions while investigating and evaluating rural creative capacity. Thus, while investigating rural creative capacity, researchers should take into consideration local knowledge in terms of its quality and its use as an input of innovation process and also the sectors which include local knowledge in their innovation and production cycles instead of focusing creative sectors defined for urban regions. In other words, rural creative capacity studies should be kept in mind those rural creative sectors which respond to the demand of post modern societies while maintaining continuity of rurality characteristics are the innovative sectors in rural regions rather than the ones which use technology. Existing training, education and extension capabilities and the participation and eagerness to participate on it must be measured while evaluating rural creative capacity rather than claiming that in rural regions there are a limited human capital. Therefore, while evaluating rural creative capacity however there is no one single sign of the association of physical distance and creative capacity of rural regions, the association of location characteristics, locality features and rural creative capacity is always positive. The diffusion of innovation, otherwise stated creative capacity is by definition a function of communication (Hägerstrand, 1966; 1967). Therefore, Hägerstrand (1966) has claimed that not the physical distance but the links between individuals in circles of acquaintances and friendship play a remarkably important role for directing information and influence that exist in farming populations. To sum up in order to evaluate creative capacity, to measure efficient use of communication technologies and built networks through these technologies, a better approach will be to measure investments in communication, the capabilities of entrepreneurs to adapt to the ICT and the capabilities of the region to attract a share of experienced entrepreneurs with social networks. In addition, in order to evaluate creative capacity, to measure the openness and tolerance of rural inhabitants to accept newcomers is much more important than measure the extension and density of social networks which are already dense and defensive in the locality. Thus rural innovation process must be taken into consideration according to the infrastructure in rural areas and that using registered data will mislead interpretations of innovation in rural areas.

The limited number of creative capacity studies and difficulty to synthesize the literature on different dimensions of creative capacity and unequal development of the literature created difficulties. However, the importance of locality parameters to measure and identify creativity of a region and the need for a special focus on rurality remained the same. Therefore, policy makers or researchers or even entrepreneurs need to forget process and implication which are mainly try to direct or control with a high hierarchy without respecting locality features – particularly tacit knowledge – in rural regions. For a sustained competitive

advantage and economic growth, relating what rural inhabitants know and how science can improve this knowledge is more important than relocalizing industries and high-tech firms in rural regions which will cause relocalisation of rural inhabitants and increase the problems of rural-urban migration and can harm cities more than imagined. However urban and rural regions cannot be thought separately and so policies cannot distinct urban and rural regions. In our knowledge-based era, one of the most precious scarce goods i.e. tacit knowledge lay down in rural regions rather than urban regions. Thus further research should be focused on ideas in rural regions which do not exist in urban regions but enrich columns in newspapers and on the diversity of these ideas coming from the locality features and led regions unique.

References

AGRANOFF, R. (2006) Inside collaborative networks: Ten lessons for public managers, *Public Administration Review, 66* (1), pp. 56-65.

AKERLOF, G.A. (1997) Social distance and social decisions, *Econometrica, 65* (5), pp. 1005-1027.

ALSTON, J.M., MARRA, M.C., PARDEY, P.G. and WYATT, T.J. (2000) Research returns redux: a meta-analysis of the returns to agricultural R&D, *The Australian Journal of Agricultural and Resource Economics, 44* (2), pp. 185-215.

AUDRETSCH, D.B. (2003) Innovation and spatial externalities, *International Regional Science Review, 26* (2), pp. 167-174.

AUTANT-BERNARD, C., BILLAND, P., FRACHISSE, D. and MASSARD, N. (2007) Social distance versus spatial distance in R&D cooperation: Empirical evidence from European collaboration choices in micro and nanotechnologies, *Papers in Regional Science, 86* (3), pp. 495-520.

BARKLEY, D.L., HENRY, M.S. and LEE D. (2006) Innovative activity in rural areas: the importance of local and regional characteristics, *Community Development Investment Review, 2* (3), pp. 1-14.

BOWEN, H.P., MOESEN, W. and SLEUWAEGEN, L. (2006) A composite index of the creative economy with application to regional best practices, *Vlerick Leuven Gent Management School Working Paper Series.*

BROWN, L. and GRILLIARD, R.S. (2006) On the interrelationship between development and migration processes, *Working Paper of The Ohio State University,* Retrieved at 09 May 2009 from http://sites.maxwell.syr.edu/clag/benchmark1980/browngilliard.pdf

BUSENITZ, L.W., GOMEZ, C. and SPENCER, J.W. (2000) Country institutional profiles: unlocking entrepreneurial phenomena, *Academy of Management Journal, 43* (5), pp. 994-1003.

CAMAGNI, R.P. and SALONE, C. (1993) Network urban structures in northern Italy: elements for a theoretical framework, *Urban Studies, 30* (6), pp. 1053-1064.

CANNARELLA, C. and PICCIONI, V. (2005) Knowledge building in rural areas: experiences from a research centre–rural SME scientific partnership in central Italy. *International Journal of Rural Management, 1* (1), pp. 1-25.

COOKE, P. (2002). *Knowledge economies: clusters, learning and cooperative advantage.* London: Routledge.

COOKE, P., MORGAN, K. (1994) The creative milieu: A regional perspective on innovation, in M. DODGSON AND R. ROTHWELL (Eds) *The Handbook of Industrial Innovation***,** pp. 25-32. Aldershot: Edward Elgar.

CORK DECLARATION, (1996) The Cork Declaration - A living countryside, in *The European conference on rural development*, 7-9 November, Ireland.

CORNFORD, J., GILLESPIE, A. and RICHARDSON, R. (1996) Regional development in the information society: A review and analysis centre for urban and regional development, paper prepared for the European High Level Expert Group on the Social and Societal Aspects of the Information Society/ CEC DGV. CURDS, Newcastle upon Tyne.

DARGAN, L. and SHUCKSMITH, M. (2008). LEADER and innovation, *Sociologia Ruralis, 48* (3), pp. 274-291.

DRUCKER, P.F. (1970) *Technology, management and society: essays*, New York: Harpercollins.

ELFRING, T. and HULSINK, W. (2003) Networks in entrepreneurship: the case of high-technology firms, *Small Business Economics, 21* (4), pp. 409-422.

FLORIDA, R. (2002) *The rise of the creative class*, New York: Basic Books.

FLORIDA, R. (2005) *Cities and the creative class.* New York: Routledge.

FONTE, M. (2008) Knowledge, food and place. a way of producing, a way of knowing, *Sociologia Ruralis, 48* (3), pp. 200-222.

FORTE, F., FUSCO GIRARD, L. and NIJKAMP, P. (2005) Smart policy, creative strategy and urban development, *Studies in Regional Science, 35* (4), pp. 497-963.

FRITSCH, M. (2007) The Geography and the Effect of Creative People in Germany, *Jena Economic Research Paper No. 2007-001*.

GALLOWAY, L. and MOCHRIE, R. (2005) The use of ICT in rural firms: a policy-oriented literature review, *Info, 7* (3), pp. 33-46.

GLAESER, E.L. (2005) Review of Richard Florida's the rise of the creative class, *Regional Science and Urban Economics, 35* (5), pp. 471-596.

GRILLICHES, Z. (1990) Patent statistics as economic indicators: A Survey, *Journal of Economic Literature*, 28 (4), pp. 1661-1707.

Grimes, S. (2000) Rural areas in the information society: diminishing distance or increasing learning capacity? *Journal of Rural Studies, 16***,** pp. 13-21.

GÜLÜMSER, A.A., BAYCAN-LEVENT, T. and NIJKAMP, P. (2009) Beauty is in the eyes of the beholder: A Logistic regression analysis of sustainability and locality as competitive vehicles for human settlements, *International Journal of Sustainable Development, 12* (1), pp. 95-110.

HÄGERSTRAND, T. (1966) Aspects of the spatial structure of social communication and the diffusion of information, *Papers in Regional Science, 16* (1), pp. 27-42.

HÄGERSTRAND, T. (1967) *Innovation diffusion as a spatial process.* USA: University of Chicago Press.

JACOBS, J. (1969) *The economy of cities*. New York: Vintage Books.

JONES, R.E., FLY, J.M., TALLEY, J., and CORDELL, H.K. (2003) Green Migration into Rural America: The New Frontier of Environmentalism?, *Society and Natural Resources, 16* (3), pp. 221-238.

KEEBLE, D. (1993) Small firm creation, innovation and growth and the urban-rural shift in J. Curran and D. Storey (Eds) *Small firms in urban and rural locations*. London: Routledge.

KEEBLE, D., TYLER, P., BROOM, G. and LEWIS, J. (1992) *Business success in the countryside: the performance of rural enterprise.* London: HMSO.

KIRCHHOFF, B.A. (1994) *Entrepreneurship and Dynamic Capitalism,* Westport: Praeger.

KNIGHT, F.H. (1967) Laissez Faire: Pro and Con, *The Journal of Political Economy, 75* (6), pp. 782-795.

KOUTSOURIS, A. (2008) The Battlefield for (sustainable) rural development: the case of Lake Plastiras, Greece, *Sociologia Ruralis, 48* (3), pp. 240-256.

LABRIANIDIS, L. and Kalogeresis, T. (2006) The digital divide in Europe's rural enterprises, *European Planning Studies, 14* (1), pp. 23-39.

LUNDVALL, B.A. (ed) (1992) *National Systems of Innovation—Towards a Theory of Innovation and Interactive Learning*, London: Pinter Publishers.

MALECKI, E.J. (2003) Digital development in rural areas: Potentials and pitfalls, *Journal of Rural Studies, 19***,** pp. 201–214.

MARSDEN, T. and SMITH, E. (2005) Ecological entrepreneurship: sustainable development in local communities through quality food production and local branding, *Geoforum, 36* (4), pp. 440-451.

MARSDEN, T. (2003) *The condition of rural sustainability,* Assen: Royal van Gorcum.

MASKELL, P., ESKELINEN, H. and HANNIBALSSON, I. (1998) *Competitiveness, localised learning and regional development: specialisation and prosperity in small open economies*. London: Routledge.

MCGRANAHAN, D. and WOJAN, T. (2007) Recasting the Creative Class to Examine Growth Processes in Rural and Urban Counties, *Regional Studies, 41* (2), pp. 197-216.

NAPIER, N.K. and NILSSON, M. (2006) The development of creative capabilities in and out of creative organizations: three case studies, *Creativity and Innovation Management, 15* (3), pp. 268-278.

NAUDE, W. (2007) Peace, Prosperity, and Pro-Growth Entrepreneurship, *Wider Discussion Paper, 2007/2*, UNU-WIDER, Finland.

NEELAMEGHAN, A. and CHESTER, G. (2006) Environmental knowledge and marginalized communities: The last mile connectivity, *Webology, 3* (1).

NELSON, R.R. and NELSON, K. (2002) Technology, institutions and innovation systems, *Research Policy, 31***,** pp. 265-272.

NIJKAMP, P. (2003) Entrepreneurship in a modern network economy, *Regional Studies, 37* (4), pp. 395-405.

NONAKA, I. (1994) A dynamic theory of organizational knowledge creation, *Organization Science, 5* (1), pp. 14-37.

NORTH, D. and SMALLBONE, D. (2000) The innovativeness and growth of rural SMEs during the 1990s, *Regional Studies, 34* (2), pp. 145-157.

NOTEBOOM, B. (1999) Innovation, learning and industrial organization, *Cambridge Journal of Economics, 23,* pp. 127-150.

PECK, J. (2007) The cult of urban creativity, in R. KEIL and R. MAHON (Eds) *The political economy of scale,* Vancouver: University of British Columbia Press.

PLOEG, J.D. van der and RENTING, H. (2004) Behind the 'redux': a rejoinder to David Goodman, *Sociologia Ruralis, 44* (2), pp. 233-242.

PLOEG, J.D. van der, RENTING, H., Brunori, G., Knickel, K., MANNION, J., MARSDEN, T., DE ROEST, K., SEVILLA-GUZMAN, E. and VENTURA, F. (2000) Rural development: from practice and policies towards theory, *Sociologia Ruralis, 40* (4), pp. 391-408.

POLANYI, M. (1997) The tacit knowledge, in L. PRUSAK, *Knowledge in organizations*, Oxford: Butterworth-Heinemann.

QIAN, H. and STOUGH, R. (2008) Social diversity and creative capital: A Regional perspective, paper presented in *International Workshop On Human Capital, Social Capital and Creative Capital as Sources of Regional Growth*, 30 June - 1 July, Tinbergen Institute and VU University, Amsterdam.

RAY, C. (1998) Culture, Intellectual power and territorial rural development, *Sociologia Ruralis, 38* (1), pp. 3-21.

RODRIGUEZ-POSE, A. (2001) Is R&D investment in lagging areas of Europe worthwhile? Theory and empirical evidence, *Papers in Regional Science, 80***,** pp. 275-295.

ROGERS, M. (1998) The definition and measurement of innovation. *Melbourne Institute Working Paper No. 10/98.*

SANTANEN, E., BRIGGS, R.O. and VREEDE de, G.J. (2000) A cognitive network model of creativity: a renewed focus on brainstorming methodology. *Proceedings of the 33rd Hawaii International Conference on System Sciences,* pp. 489-494.

SASSEN, S. (2001) *The global city: New York, London, Tokyo.* Princeton: Princeton University Press.

SCHUMPETER, J.A. (1934) *The Theory of Economic Development,* translated by R. OPIE. Cambridge, MA: Harvard University Press.

SCHUMPETER, J.A. (1950) *Capitalism, socialism and democracy*, New York: Harper and Row.

SCOTT, A. (2006) Entrepreneurship, innovation and industrial development: geography and the creative field revisited, *Journal Small Business Economics, 26* (1), pp. 1-24 .

SEN, A. (2000) Social exclusion: concept, application, and scrutiny, *Social Development Papers No.1*. Manila, Philippines: Office of Environment and Social Development Asian Development Bank.

SIEBERT, R., LASCHEWSKI, L. and DOSCH, A. (2008) Knowledge dynamics in valorising local nature, *Sociologia Ruralis, 48* (3), pp. 223-240.

STERNBERG, R.J. (1998) *Handbook of creativity*. New York: Cambridge University Press.

STRUYK, R.J., JAMES, F.J. (1975) Intrametropolitan industrial location: The pattern and process of change, Lexington, MA: Lexington Books.

TAYLOR, P.J. (2004) *World city network – A global urban analysis*, New York: Routledge.

TOVEY, H. (2008) Introduction: rural sustainable development in the era of knowledge society, *Sociologia Ruralis, Special Issue on Rural Sustainable Development in the Era of Knowledge Society, 48* (3), pp. 185-189.

TRULLEN, J. and BOIX, R. (2003) Barcelona, polycentric metropolis and network of cities. Paper presented at the *Workshop on spatial networks and clusters: urban and regional prosperity in a globalised economy*. Universitat Rovira i Virgili, March 6-8.

VAZ, Noronha T., de, MORGAN, E.J. and NIJKAMP, P. (2006) *The new European rurality: strategies for small firms,* Aldershot: Ashgate Publishing.

VIAS, A. (1999) Jobs follow people in the rural Rocky Mountain West, *Rural Development Perspectives, 14*(2), pp. 14-23.

WARD, S. and WILLIAMS, R. (1997) From hierarchy to networks? Sub-central government and EU urban environment policy, *Journal of Common Market Studies, 35*(3), pp. 439-464.

WENNEKERS, S. and THURIK, R. (1999) Linking entrepreneurship and economic growth, *Small Business Economics, 13* (1), pp. 27-56.

WESTLUND, H. and BOLTON, R. (2003) Local social capital and entrepreneurship, *Small Business Economics, 21,* pp. 77-113.

WIIG, K.M. (1997) Integrating intellectual capital and knowledge management, *Long Range Planning, 30,* pp. 399-405.

WINTER, M. (2003) Embeddedness, the new food economy and defensive localism, *Journal of Rural Studies, 19* (1), pp. 23-32.

2007-1	M. Francesca Cracolici Miranda Cuffaro Peter Nijkamp	Geographical distribution of enemployment: An analysis of provincial differences in Italy, 21 p.
2007-2	Daniel Leliefeld Evgenia Motchenkova	To protec in order to serve, adverse effects of leniency programs in view of industry asymmetry, 29 p.
2007-3	M.C. Wassenaar E. Dijkgraaf R.H.J.M. Gradus	Contracting out: Dutch municipalities reject the solution for the VAT-distortion, 24 p.
2007-4	R.S. Halbersma M.C. Mikkers E. Motchenkova I. Seinen	Market structure and hospital-insurer bargaining in the Netherlands, 20 p.
2007-5	Bas P. Singer Bart A.G. Bossink Herman J.M. Vande Putte	Corporate Real estate and competitive strategy, 27 p.
2007-6	Dorien Kooij Annet de Lange Paul Jansen Josje Dikkers	Older workers' motivation to continue to work: Five meanings of age. A conceptual review, 46 p.
2007-7	Stella Flytzani Peter Nijkamp	Locus of control and cross-cultural adjustment of expatriate managers, 16 p.
2007-8	Tibert Verhagen Willemijn van Dolen	Explaining online purchase intentions: A multi-channel store image perspective, 28 p.
2007-9	Patrizia Riganti Peter Nijkamp	Congestion in popular tourist areas: A multi-attribute experimental choice analysis of willingness-to-wait in Amsterdam, 21 p.
2007-10	Tüzin Baycan-Levent Peter Nijkamp	Critical success factors in planning and management of urban green spaces in Europe, 14 p.
2007-11	Tüzin Baycan-Levent Peter Nijkamp	Migrant entrepreneurship in a diverse Europe: In search of sustainable development, 18 p.
2007-12	Tüzin Baycan-Levent Peter Nijkamp Mediha Sahin	New orientations in ethnic entrepreneurship: Motivation, goals and strategies in new generation ethnic entrepreneurs, 22 p.
2007-13	Miranda Cuffaro Maria Francesca Cracolici Peter Nijkamp	Measuring the performance of Italian regions on social and economic dimensions, 20 p.

2007-14	Tüzin Baycan-Levent Peter Nijkamp	Characteristics of migrant entrepreneurship in Europe, 14 p.
2007-15	Maria Teresa Borzacchiello Peter Nijkamp Eric Koomen	Accessibility and urban development: A grid-based comparative statistical analysis of Dutch cities, 22 p.
2007-16	Tibert Verhagen Selmar Meents	A framework for developing semantic differentials in IS research: Assessing the meaning of electronic marketplace quality (EMQ), 64 p.
2007-17	Aliye Ahu Gülümser Tüzin Baycan Levent Peter Nijkamp	Changing trends in rural self-employment in Europe, 34 p.
2007-18	Laura de Dominicis Raymond J.G.M. Florax Henri L.F. de Groot	De ruimtelijke verdeling van economische activiteit: Agglomeratie- en locatiepatronen in Nederland, 35 p.
2007-19	E. Dijkgraaf R.H.J.M. Gradus	How to get increasing competition in the Dutch refuse collection market? 15 p.

2008-1	Maria T. Borzacchiello Irene Casas Biagio Ciuffo Peter Nijkamp	Geo-ICT in Transportation Science, 25 p.
2008-2	Maura Soekijad Jeroen Walschots Marleen Huysman	Congestion at the floating road? Negotiation in networked innovation, 38 p.
2008-3	Marlous Agterberg Bart van den Hooff Marleen Huysman Maura Soekijad	Keeping the wheels turning: Multi-level dynamics in organizing networks of practice, 47 p.
2008-4	Marlous Agterberg Marleen Huysman Bart van den Hooff	Leadership in online knowledge networks: Challenges and coping strategies in a network of practice, 36 p.
2008-5	Bernd Heidergott Haralambie Leahu	Differentiability of product measures, 35 p.
2008-6	Tibert Verhagen Frans Feldberg Bart van den Hooff Selmar Meents	Explaining user adoption of virtual worlds: towards a multipurpose motivational model, 37 p.
2008-7	Masagus M. Ridhwan Peter Nijkamp Piet Rietveld Henri L.F. de Groot	Regional development and monetary policy. A review of the role of monetary unions, capital mobility and locational effects, 27 p.
2008-8	Selmar Meents Tibert Verhagen	Investigating the impact of C2C electronic marketplace quality on trust, 69 p.
2008-9	Junbo Yu Peter Nijkamp	China's prospects as an innovative country: An industrial economics perspective, 27 p
2008-10	Junbo Yu Peter Nijkamp	Ownership, r&d and productivity change: Assessing the catch-up in China's high-tech industries, 31 p
2008-11	Elbert Dijkgraaf Raymond Gradus	Environmental activism and dynamics of unit-based pricing systems, 18 p.
2008-12	Mark J. Koetse Jan Rouwendal	Transport and welfare consequences of infrastructure investment: A case study for the Betuweroute, 24 p
2008-13	Marc D. Bahlmann Marleen H. Huysman Tom Elfring Peter Groenewegen	Clusters as vehicles for entrepreneurial innovation and new idea generation – a critical assessment
2008-14	Soushi Suzuki Peter Nijkamp	A generalized goals-achievement model in data envelopment analysis: An application to efficiency improvement in local government finance in Japan, 24 p.
2008-15	Tüzin Baycan-Levent	External orientation of second generation migrant entrepreneurs. A sectoral

	Peter Nijkamp Mediha Sahin	study on Amsterdam, 33 p.
2008-16	Enno Masurel	Local shopkeepers' associations and ethnic minority entrepreneurs, 21 p.
2008-17	Frank Frößler Boriana Rukanova Stefan Klein Allen Higgins Yao-Hua Tan	Inter-organisational network formation and sense-making: Initiation and management of a living lab, 25 p.
2008-18	Peter Nijkamp Frank Zwetsloot Sander van der Wal	A meta-multicriteria analysis of innovation and growth potentials of European regions, 20 p.
2008-19	Junbo Yu Roger R. Stough Peter Nijkamp	Governing technological entrepreneurship in China and the West, 21 p.
2008-20	Maria T. Borzacchiello Peter Nijkamp Henk J. Scholten	A logistic regression model for explaining urban development on the basis of accessibility: a case study of Naples, 13 p.
2008-21	Marius Ooms	Trends in applied econometrics software development 1985-2008, an analysis of Journal of Applied Econometrics research articles, software reviews, data and code, 30 p.
2008-22	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Changing trends in rural self-employment in Europe and Turkey, 20 p.
2008-23	Patricia van Hemert Peter Nijkamp	Thematic research prioritization in the EU and the Netherlands: an assessment on the basis of content analysis, 30 p.
2008-24	Jasper Dekkers Eric Koomen	Valuation of open space. Hedonic house price analysis in the Dutch Randstad region, 19 p.

2009-1	Boriana Rukanova Rolf T. Wignand Yao-Hua Tan	From national to supranational government inter-organizational systems: An extended typology, 33 p.
2009-2	Marc D. Bahlmann Marleen H. Huysman Tom Elfring Peter Groenewegen	Global Pipelines or global buzz? A micro-level approach towards the knowledge-based view of clusters, 33 p.
2009-3	Julie E. Ferguson Marleen H. Huysman	Between ambition and approach: Towards sustainable knowledge management in development organizations, 33 p.
2009-4	Mark G. Leijsen	Why empirical cost functions get scale economies wrong, 11 p.
2009-5	Peter Nijkamp Galit Cohen-Blankshtain	The importance of ICT for cities: e-governance and cyber perceptions, 14 p.
2009-6	Eric de Noronha Vaz Mário Caetano Peter Nijkamp	Trapped between antiquity and urbanism. A multi-criteria assessment model of the greater Cairo metropolitan area, 22 p.
2009-7	Eric de Noronha Vaz Teresa de Noronha Vaz Peter Nijkamp	Spatial analysis for policy evaluation of the rural world: Portuguese agriculture in the last decade, 16 p.
2009-8	Teresa de Noronha Vaz Peter Nijkamp	Multitasking in the rural world: Technological change and sustainability, 20 p.
2009-9	Maria Teresa Borzacchiello Vincenzo Torrieri Peter Nijkamp	An operational information systems architecture for assessing sustainable transportation planning: Principles and design, 17 p.
2009-10	Vincenzo Del Giudice Pierfrancesco De Paola Francesca Torrieri Francesca Pagliari Peter Nijkamp	A decision support system for real estate investment choice, 16 p.
2009-11	Miruna Mazurencu Marinescu Peter Nijkamp	IT companies in rough seas: Predictive factors for bankruptcy risk in Romania, 13 p.
2009-12	Boriana Rukanova Helle Zinner Hendriksen Eveline van Stijn Yao-Hua Tan	Bringing is innovation in a highly-regulated environment: A collective action perspective, 33 p.
2009-13	Patricia van Hemert Peter Nijkamp Jolanda Verbraak	Evaluating social science and humanities knowledge production: an exploratory analysis of dynamics in science systems, 20 p.

2009-14	Roberto Patuelli Aura Reggiani Peter Nijkamp Norbert Schanne	Neural networks for cross-sectional employment forecasts: A comparison of model specifications for Germany, 15 p.
2009-15	André de Waal Karima Kourtit Peter Nijkamp	The relationship between the level of completeness of a strategic performance management system and perceived advantages and disadvantages, 19 p.
2009-16	Vincenzo Punzo Vincenzo Torrieri Maria Teresa Borzacchiello Biagio Ciuffo Peter Nijkamp	Modelling intermodal re-balance and integration: planning a sub-lagoon tube for Venezia, 24 p.
2009-17	Peter Nijkamp Roger Stough Mediha Sahin	Impact of social and human capital on business performance of migrant entrepreneurs – a comparative Dutch-US study, 31 p.
2009-18	Dres Creal	A survey of sequential Monte Carlo methods for economics and finance, 54 p.
2009-19	Karima Kourtit André de Waal	Strategic performance management in practice: Advantages, disadvantages and reasons for use, 15 p.
2009-20	Karima Kourtit André de Waal Peter Nijkamp	Strategic performance management and creative industry, 17 p.
2009-21	Eric de Noronha Vaz Peter Nijkamp	Historico-cultural sustainability and urban dynamics – a geo-information science approach to the Algarve area, 25 p.
2009-22	Roberta Capello Peter Nijkamp	Regional growth and development theories revisited, 19 p.
2009-23	M. Francesca Cracolici Miranda Cuffaro Peter Nijkamp	Tourism sustainability and economic efficiency – a statistical analysis of Italian provinces, 14 p.
2009-24	Caroline A. Rodenburg Peter Nijkamp Henri L.F. de Groot Erik T. Verhoef	Valuation of multifunctional land use by commercial investors: A case study on the Amsterdam Zuidas mega-project, 21 p.
2009-25	Katrin Oltmer Peter Nijkamp Raymond Florax Floor Brouwer	Sustainability and agri-environmental policy in the European Union: A meta-analytic investigation, 26 p.
2009-26	Francesca Torrieri Peter Nijkamp	Scenario analysis in spatial impact assessment: A methodological approach, 20 p.
2009-27	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Beauty is in the eyes of the beholder: A logistic regression analysis of sustainability and locality as competitive vehicles for human settlements, 14 p.

2009-28	Marco Percoco Peter Nijkamp	Individual time preferences and social discounting in environmental projects, 24 p.
2009-29	Peter Nijkamp Maria Abreu	Regional development theory, 12 p.
2009-30	Tüzin Baycan-Levent Peter Nijkamp	7 FAQs in urban planning, 22 p.
2009-31	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Turkey's rurality: A comparative analysis at the EU level, 22 p.
2009-32	Frank Bruinsma Karima Kourtit Peter Nijkamp	An agent-based decision support model for the development of e-services in the tourist sector, 21 p.
2009-33	Mediha Sahin Peter Nijkamp Marius Rietdijk	Cultural diversity and urban innovativeness: Personal and business characteristics of urban migrant entrepreneurs, 27 p.
2009-34	Peter Nijkamp Mediha Sahin	Performance indicators of urban migrant entrepreneurship in the Netherlands, 28 p.
2009-35	Manfred M. Fischer Peter Nijkamp	Entrepreneurship and regional development, 23 p.
2009-36	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	Cultural heritage and creative cities: An economic evaluation perspective, 20 p.
2009-37	Enno Masurel Peter Nijkamp	Bridging the gap between institutions of higher education and small and medium-size enterprises, 32 p.
2009-38	Francesca Medda Peter Nijkamp Piet Rietveld	Dynamic effects of external and private transport costs on urban shape: A morphogenetic perspective, 17 p.
2009-39	Roberta Capello Peter Nijkamp	Urban economics at a cross-yard: Recent theoretical and methodological directions and future challenges, 16 p.
2009-40	Enno Masurel Peter Nijkamp	The low participation of urban migrant entrepreneurs: Reasons and perceptions of weak institutional embeddedness, 23 p.
2009-41	Patricia van Hemert Peter Nijkamp	Knowledge investments, business R&D and innovativeness of countries. A qualitative meta-analytic comparison, 25 p.
2009-42	Teresa de Noronha Vaz Peter Nijkamp	Knowledge and innovation: The strings between global and local dimensions of sustainable growth, 16 p.
2009-43	Chiara M. Travisi Peter Nijkamp	Managing environmental risk in agriculture: A systematic perspective on the potential of quantitative policy-oriented risk valuation, 19 p.
2009-44	Sander de Leeuw	Logistics aspects of emergency preparedness in flood disaster prevention, 24 p.

	Iris F.A. Vis Sebastiaan B. Jonkman	
2009-45	Eveline S. van Leeuwen Peter Nijkamp	Social accounting matrices. The development and application of SAMs at the local level, 26 p.
2009-46	Tibert Verhagen Willemijn van Dolen	The influence of online store characteristics on consumer impulsive decision-making: A model and empirical application, 33 p.
2009-47	Eveline van Leeuwen Peter Nijkamp	A micro-simulation model for e-services in cultural heritage tourism, 23 p.
2009-48	Andrea Caragliu Chiara Del Bo Peter Nijkamp	Smart cities in Europe, 15 p.
2009-49	Faroek Lazrak Peter Nijkamp Piet Rietveld Jan Rouwendal	Cultural heritage: Hedonic prices for non-market values, 11 p.
2009-50	Eric de Noronha Vaz João Pedro Bernardes Peter Nijkamp	Past landscapes for the reconstruction of Roman land use: Eco-history tourism in the Algarve, 23 p.
2009-51	Eveline van Leeuwen Peter Nijkamp Teresa de Noronha Vaz	The Multi-functional use of urban green space, 12 p.
2009-52	Peter Bakker Carl Koopmans Peter Nijkamp	Appraisal of integrated transport policies, 20 p.
2009-53	Luca De Angelis Leonard J. Paas	The dynamics analysis and prediction of stock markets through the latent Markov model, 29 p.
2009-54	Jan Anne Annema Carl Koopmans	Een lastige praktijk: Ervaringen met waarderen van omgevingskwaliteit in de kosten-batenanalyse, 17 p.
2009-55	Bas Straathof Gert-Jan Linders	Europe's internal market at fifty: Over the hill? 39 p.
2009-56	Joaquim A.S. Gromicho Jelke J. van Hoorn Francisco Saldanha-da-Gama Gerrit T. Timmer	Exponentially better than brute force: solving the job-shop scheduling problem optimally by dynamic programming, 14 p.
2009-57	Carmen Lee Roman Kraeussl Leo Paas	The effect of anticipated and experienced regret and pride on investors' future selling decisions, 31 p.
2009-58	René Sitters	Efficient algorithms for average completion time scheduling, 17 p.

2009-59	Masood Gheasi Peter Nijkamp Piet Rietveld	Migration and tourist flows, 20 p.

2010-1	Roberto Patuelli Norbert Schanne Daniel A. Griffith Peter Nijkamp	Persistent disparities in regional unemployment: Application of a spatial filtering approach to local labour markets in Germany, 28 p.
2010-2	Thomas de Graaff Ghebre Debrezion Piet Rietveld	Schaalsprong Almere. Het effect van bereikbaarheidsverbeteringen op de huizenprijzen in Almere, 22 p.
2010-3	John Steenbruggen Maria Teresa Borzacchiello Peter Nijkamp Henk Scholten	Real-time data from mobile phone networks for urban incidence and traffic management – a review of application and opportunities, 23 p.
2010-4	Marc D. Bahlmann Tom Elfring Peter Groenewegen Marleen H. Huysman	Does distance matter? An ego-network approach towards the knowledge-based theory of clusters, 31 p.
2010-5	Jelke J. van Hoorn	A note on the worst case complexity for the capacitated vehicle routing problem, 3 p.
2010-6	Mark G. Lijesen	Empirical applications of spatial competition; an interpretative literature review, 16 p.
2010-7	Carmen Lee Roman Kraeussl Leo Paas	Personality and investment: Personality differences affect investors' adaptation to losses, 28 p.
2010-8	Nahom Ghebrihiwet Evgenia Motchenkova	Leniency programs in the presence of judicial errors, 21 p.
2010-9	Meindert J. Flikkema Ard-Pieter de Man Matthijs Wolters	New trademark registration as an indicator of innovation: results of an explorative study of Benelux trademark data, 53 p.
2010-10	Jani Merikivi Tibert Verhagen Frans Feldberg	Having belief(s) in social virtual worlds: A decomposed approach, 37 p.
2010-11	Umut Kilinç	Price-cost markups and productivity dynamics of entrant plants, 34 p.
2010-12	Umut Kilinç	Measuring competition in a frictional economy, 39 p.

2011-1	Yoshifumi Takahashi Peter Nijkamp	Multifunctional agricultural land use in sustainable world, 25 p.
2011-2	Paulo A.L.D. Nunes Peter Nijkamp	Biodiversity: Economic perspectives, 37 p.
2011-3	Eric de Noronha Vaz Doan Nainggolan Peter Nijkamp Marco Painho	A complex spatial systems analysis of tourism and urban sprawl in the Algarve, 23 p.
2011-4	Karima Kourtit Peter Nijkamp	Strangers on the move. Ethnic entrepreneurs as urban change actors, 34 p.
2011-5	Manie Geyer Helen C. Coetzee Danie Du Plessis Ronnie Donaldson Peter Nijkamp	Recent business transformation in intermediate-sized cities in South Africa, 30 p.
2011-6	Aki Kangasharju Christophe Tavéra Peter Nijkamp	Regional growth and unemployment. The validity of Okun's law for the Finnish regions, 17 p.
2011-7	Amitrajeet A. Batabyal Peter Nijkamp	A Schumpeterian model of entrepreneurship, innovation, and regional economic growth, 30 p.
2011-8	Aliye Ahu Akgün Tüzin Baycan Levent Peter Nijkamp	The engine of sustainable rural development: Embeddedness of entrepreneurs in rural Turkey, 17 p.
2011-9	Aliye Ahu Akgün Eveline van Leeuwen Peter Nijkamp	A systemic perspective on multi-stakeholder sustainable development strategies, 26 p.
2011-10	Tibert Verhagen Jaap van Nes Frans Feldberg Willemijn van Dolen	Virtual customer service agents: Using social presence and personalization to shape online service encounters, 48 p.
2011-11	Henk J. Scholten Maarten van der Vlist	De inrichting van crisisbeheersing, de relatie tussen besluitvorming en informatievoorziening. Casus: Warroom project Netcentrisch werken bij Rijkswaterstaat, 23 p.
2011-12	Tüzin Baycan Peter Nijkamp	A socio-economic impact analysis of cultural diversity, 22 p.
2011-13	Aliye Ahu Akgün Tüzin Baycan Peter Nijkamp	Repositioning rural areas as promising future hot spots, 22 p.
2011-14	Selmar Meents Tibert Verhagen Paul Vlaar	How sellers can stimulate purchasing in electronic marketplaces: Using information as a risk reduction signal, 29 p.p

2011-15	Aliye Ahu Gülümser Tüzin Baycan-Levent Peter Nijkamp	Measuring regional creative capacity: A literature review for rural-specific approaches, 22 p.